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ABSTRACT

This document describes the development of theme-based projects within a European co-operative environmental education framework at the secondary school level. The participation of 15 students from 9 different European countries in one such project is described. Students are involved with the publication of articles based on firsthand observations of ozone layer research taking place in polar laboratories. The writings of the young reporters are then collated in a multilingual newspaper published every two months by the students. Several components of the program are addressed including local inquiries, assignments, and assessment. The underlying pedagogical aspects and the key factors that made the program worthwhile from an educational point of view are outlined. The extension of the ozone project within a permanent network encompassing secondary schools across Europe is discussed. An appendix provides the network's charter. (LZ)

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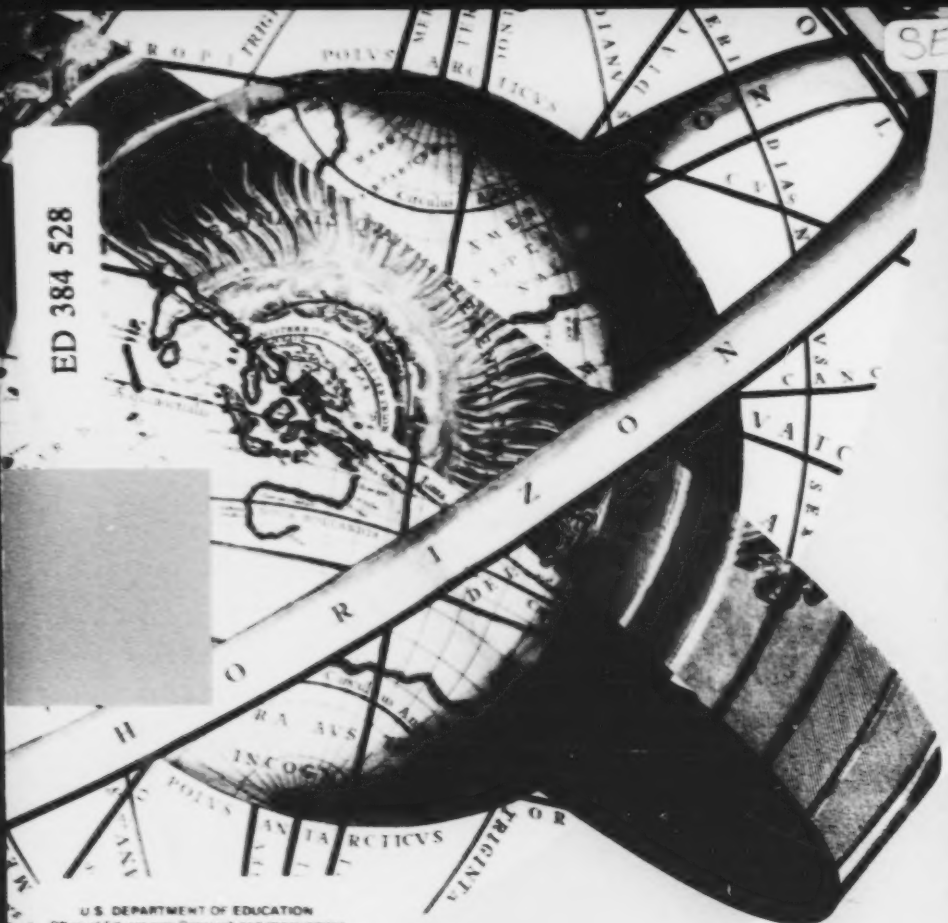

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Secondary education

The ozone project

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The ozone project

Philippe Saugier
Secretariat of "Jeunes reporters pour l'environnement"
run by the Foundation for Environmental Education
in Europe

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The **Council of Europe** was founded in 1949 to achieve greater unity between European parliamentary democracies. It is the oldest of the European political institutions and has 33 member states,[1] including the 12 members of the European Community. It is the widest intergovernmental and interparliamentary grouping in Europe, and has its headquarters in the French city of Strasbourg.

Only questions related to national defence are excluded from the Council of Europe's work, and the Organisation has activities in the following areas: democracy, human rights and fundamental freedoms; media and communication; social and economic affairs; education, culture, heritage and sport; youth; health; environment and regional planning; local democracy; and legal co-operation.

The **European Cultural Convention** was opened for signature in 1954. This international treaty is open to European countries that are not members of the Council of Europe, and it enables them to take part in the Organisation's programmes on education, culture, sport and youth. So far, 42 states have acceded to the European Cultural Convention: the Council of Europe's full member states plus Albania, Belarus, Croatia, the Holy See, Latvia, Moldova, Monaco, Russia, Ukraine.

The **Council for Cultural Co-operation** (the **CDCC**) is responsible for the Council of Europe's work on education and culture. Four specialised committees – the Education Committee, the Standing Conference on University Problems, the Culture Committee and the Cultural Heritage Committee – help the CDCC to carry out its tasks under the European Cultural Convention. There is also a close working relationship between the CDCC and the regular

1. Andorra, Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, San Marino, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom.

conferences of specialised European ministers responsible for education, culture and the cultural heritage.

The CDCC's programmes are an integral part of the Council of Europe's work, and, like the programmes in other sectors, they contribute to the Organisation's three over-arching policy objectives for the 1990s:

- the protection, reinforcement and promotion of human rights and fundamental freedoms and pluralist democracy;
- the promotion of an awareness of European identity;
- the search for common responses to the great challenges facing European society.

The CDCC's education programme covers school, higher and adult education, as well as educational research. At present, its main priorities are projects on: the European dimension of secondary education; university co-operation; adult education and social change; modern languages; and the pooling of the results of educational research.

In 1991, the Council for Cultural Co-operation of the Council of Europe launched a project entitled "A secondary education for Europe". The aims of the project are to:

- give young people the knowledge, skills and attitudes they will need to meet the major challenges of European society;
- prepare young people for higher education, and for mobility, work and daily life in a multilingual and multicultural education;
- make young people aware of their common cultural heritage and their shared responsibilities as Europeans.

This project has two elements: the first devoted to reflections and consultations between the member states on

the overall policies and strategies, and the second on the European dimension in the school curriculum.

The aim of this series of monographs is to present succinctly either practical experiences of integrating the European dimension into school or out-of-school life, or examples of contents or themes which could be the basis of reflections or discussions for teachers.

Since the aim of these monographs is to give rise to discussions and exchanges of views, the opinions and judgments contained in them are those of the authors and do not necessarily reflect the official policy of the Council of Europe and its Council for Cultural Co-operation on the subjects dealt with.

List of monographs

- Teaching about society, passing on values – Elementary law in civic education
  ISBN 92-871-2300-4
- Dostoyevsky and Europe
  ISBN 92-871-2277-6
- Teaching for exchanges – aims and ways of teacher training
  ISBN 92-871-2279-2
- European clubs
  ISBN 92-871-2125-7
- The fax! programme
  ISBN 92-871-2412-4
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Introduction

What is happening to the ozone layer over the North Pole? Pilot balloons, laboratory planes and ground-based instruments were used throughout the winter of 1991-92 to investigate the upper atmosphere from numerous sites as part of the European Arctic Stratospheric Ozone Experiment. In the twilight world of polar laboratories, in the northernmost part of Scandinavia, some unusual visitors were given the opportunity to witness science in the making: fifteen or so young reporters, representing fifteen groups of pupils from Danish, Finish, French, German, Latvian, Norwegian, Polish, Swedish and Swiss secondary schools.

A total of three assignments enabled them to observe the evolution of knowledge at first hand: thanks to the scientists' helpful attitude towards the excited youngsters, the latter were able to produce vivid reports concerning complex scientific issues. The investigations were managed from a distance by groups of correspondents, using a videotext server provided by the University of Copenhagen. Dispatches, articles and reactions were exchanged daily before being collated in a multilingual newspaper published every two months by the pupils.

Each team had undertaken meticulous preparations for the assignments, by conducting inquiries in its own school, town and country. The young journalists polled their friends and acquaintances, interviewed scientists and local councillors and industrialists on the subject of environmental problems, in order to gain insight into the roots of the problem and formulate relevant questions.

The programme was conducted on an experimental basis by the Foundation for Environmental Education in Europe (FEEE), with a view to devising an approach to environ-

mental education at secondary school level centred on theme-based projects within a European co-operative framework.

This document[1] describes the main developments in this process: local inquiries, assignments and assessment. Through a process of reflection illuminated by experience, it goes on to outline the underlying pedagogical aspects and the key factors that made the programme worthwhile from an educational point of view, in an effort to demonstrate the particular intention of the teachers and their various partners. The observations and views contained herein are those of the author, and are not necessarily shared by the FEEE, nor indeed by all who participated in the ozone project. Founded in the early 1980s by a group of experts from the Council of Europe, the FEEE conducts awareness-raising initiatives at regional, national and international level. A full progress report has been published in French under the title *Synthèse du projet ozone*. The fifty-page document details all of the work carried out and makes enjoyable reading for anyone not familiar with the project, with its well spaced-out format, illustrations and numerous brief summaries inserted in the text.

1. For further details or to obtain a copy of this document, please contact: Foundation for Environmental Education in Europe (FEEE), Secretariat of the "Jeunes reporters pour l'environnement", 127, rue de Flandre, 75019 Paris, France. Tel.: (33-1) 40 35 02 31, Fax: (33-1) 40 35 02 33, E-mail SAUGIER@FRLAPP51.

A thousand secondary school pupils from all over Europe grapple with research into polar ozone

Background

In 1975 a very special farm was set up in Villiers-le-Bâcle (22 kilometres from Paris), in what is still a rural area: the ferme du Bel-air, France's first "children's farm". Since then, thousands of pupils from the suburbs of Paris have stayed there to learn about nature.

Situated on the edge of the vallée de Chevreuse, which is home to a substantial share of France's scientific research facilities, the farm gradually developed into an environmental education centre. Researchers and teachers from Granis (Groupement régional d'animation scientifique) established direct, long-term links between children and scientists, while the Nomades'land association looked after the communication side of things, journalism and education being its specialist fields.

In 1987, three young French reporters investigated the Aids problem on the Ivory Coast as part of a research assignment organised by the Pasteur Institute. Eight classes of 14- to 15-year-olds received dispatches by videotext. A book was published and a new concept born.

Two years later, the Nomades'land association acquired a European dimension by producing a daily newspaper run by a forum of pupils and teachers from the twelve member states of the European Community at the teachers' training college of Antony (Hauts-de-Seine, France).

In the spring of 1989, Granis drew attention to research being carried out into the problems of the ozone layer. At the instigation of Professor G. Mégie, a specialist consulted on the subject, an "ozone project" designed for French schools was extended to thirty secondary schools throughout Europe.

Project timetable

Conception and pilot phase: 1990-91

- September 1990: the Commission of the European Communities financed the pilot phase. The idea was to involve a small number of secondary schools in the design of the project, planned for 1991-92. Five teams were recruited: Copenhagen (Denmark), Kiruna (Sweden), Gif-sur-Yvette (France), Geneva (Switzerland) and Oldenburg (Germany).
- 2 to 4 March 1991: first meeting of the organising committee at the ferme du Bel-air, attended by representatives from the pilot teams.
- April 1991: since the project exceeded the local remits of the associations that had spawned it, the French Ministry of the Environment suggested that they team up with the Foundation for Environmental Education in Europe, which took it under its wing in July 1991.
- 8 to 10 June 1991: second meeting of the organising committee in Ballerup (Denmark), at the secondary school and Copenhagen teachers' training college (KDAS).
- 31 August to 6 September 1991: forum of the pilot teams. About fifty or so pupils and teachers met in Gif-sur-Yvette to launch the operational phase of the project.
- April to October: including the pilot teams, twenty-four groups were recruited in ten European countries.

Operational phase: 1991-92

- September to December 1991: local inquiries by each group.
- 22 to 24 November 1991: third meeting of the organising committee, Sismondi Secondary School, Geneva.

- 12 to 23 December 1991: first assignment of the young reporters in Kiruna (Sweden).
- 18 to 29 January 1992: second assignment in Kiruna.
- 8 to 20 February 1992: third assignment in Sodankylä and Utsjoki (Finland).
- 24 to 26 April 1992: fourth meeting of the organising committee, at Hjalmar Lundbohm secondary school, Kiruna.
- 13 to 18 October 1992: final forum – a hundred or so participants from seven countries (Denmark, Finland, France, Latvia, Norway, Poland and Switzerland) discussed their respective experiences in Ballerup (Denmark).

At the heart of the project: the process of inquiry

Local inquiries

The whole purpose of the young reporters' assignments is to provide information that can be used by their eagerly-awaiting and highly motivated "correspondents" back home. The young reporters themselves were only allowed to go on a assignment once they had completed work that met a fundamental criterion: it had to be the result of field surveys, in other words, the pursuit of information other than that provided by books, the press or teachers. They were thus required to carry out the groundwork, while acquiring as deep an insight as possible into the numerous aspects of the problem: the inquiries form the main body of the project, the core of the collective effort and a solid focus for each individual participant.

Such were the objectives of the initial phase of the project, this lasted until 31 December 1991, namely the closing date for written applications for the assignments. Only four applications were turned down because they did not contain information derived from field surveys, but were

merely rehashes of material obtained from documentary sources.

Conducting inquiries meant tracking down information and communicating:

- the approach adopted – for example, the failures, successes, anecdotes, partial results, etc., thanks to a computer network, the setting up of which constituted a task in its own right for each group;
- the results – by means of a newspaper compiled by the teams of volunteers, and which was designed to foster the discipline of writing as a means of reporting. Seven issues were produced; the cover pages are shown on pages 18 and 19.

Below are short extracts from five different articles, specially chosen to show how, thanks to the enthusiasm generated by European interaction and the discipline of journalistic inquiry, the same basic topic can engender a wide variety of approaches: the implications of CFCs for industry, scientific research in Greenland, the political angle on environmental problems, the use of CFCs in the Soviet nuclear defence system and, finally, a dialogue between young children concerning the hole in the ozone layer.

The ozone project interviews a Danish researcher

Ibn Johnsen works at the Institute of Ecological Botany at the University of Copenhagen, where he studies the effects of UV rays on plant life. In winter, he spends his time in Denmark studying the development of lichen subjected to artificial UV rays in greenhouses. His main research activities, however, take place in the summer, in the Arctic latitudes of Greenland. There he studies the lichen in their natural habitat. He observes the damage caused to plants under natural conditions in order to compare it with the damage inflicted on his own lichen cultivated under glass.

(København Dag-og Aftenseminarium, Ballerup, Denmark)

An alternative refrigeration system for Soviet radar stations

"Dnepra" is part of the Soviet defence system and its military purpose is to detect the launch of enemy strategic ballistic missile rockets and to raise the alarm. In the meantime, however, Dnepra observes the earth's artificial satellites and satellite fragments, of which there are an ever growing number.

The construction of the Dnepra radar station in Skrunda, Latvia, began in 1964 and took three years. The station is made up of two pairs of interconnecting sheds, resembling large greenhouses. Each unit serves as both a receiving and a transmitting antenna, and their layout makes it possible to span a 180 degree horizon. To the north, the nearest Dnepra station is situated near Murmansk, while to the south, the nearest is in Mukachev (western Ukraine). The stations are scattered right across the Soviet Union.

The Skrunda station houses six cooling plants containing 350 kilograms of freons each, plus a further eight containing 2 000 kilograms of freons. In total, 17,4 tonnes of freons are stored, 151 kilograms of which escape each year.

(Rigas Francu Licejs, Riga, Latvia)

A morning with Mr Le Déaut, MP

Mr Jean-Yves Le Déaut, our local MP, is the author of the bill on the ratification of the Montreal Treaty by the National Assembly, and president of the parliamentary office in charge of assessing scientific and technological options. On Friday 20 December 1991, he spent two hours at our school explaining the purpose of his governmental activities.

The environment has become a major issue in recent years. It is for this reason that the political office was set up to discuss the various problems. The main areas dealt with are water, nuclear power, industrial choices, health and ethics (genetic engineering). At the moment, one of the main topics of concern is stratospheric ozone.

(Lycée Jacques Marquette, Pont-à-Mousson, France)

How industries are coping with the Montreal Protocol

A subsidiary of Elf-Aquitaine, Atochem is a major producer of chlorofluorocarbons (CFCs). Mr Bourgeois, production manager, answers pupils' questions.

What was your reaction when you were told that you had to cease production of CFCs by the year 2000, if not before?

Our company had already anticipated that it would have to replace its products; that sort of thing takes place gradually. We already had some ideas for other molecules on our files, but they had been shelved because CFCs, it has to be said, are ideal products. Apart from the effects on the ozone, they really are hard to beat. So, before depriving yourself of a product with these advantages in terms of cost, properties and safety (CFCs are completely harmless and non-flammable), you naturally think twice. When you transform a product in order to make it less damaging to the environment, it also becomes more unstable.

(Lycée de la vallée de Chevreuse, Gif-sur-Yvette, France)

Through the eyes of young Swiss children: "A sort of hole in the ozone layer"

We asked children with an average age of 9 to explain what they understood by the term "hole in the ozone layer".

What do you know about the hole in the ozone layer?
- It's a hole, which makes the sunlight stronger. It destroys things like plants and animals.
- Nothing! I don't know anything. Just that it's bad for our environment and that we should be careful. We mustn't launch any more bombs.
- A sort of hole in the ozone layer.
- It's in the water. I know that there are five "ozones", one of them is called the "Indian" one. As for the others, I can't remember.

Are you afraid of it?
- If there wasn't any ozone layer, ultraviolet rays would reach the earth and everything would be destroyed.
- No, it's only dangerous for the environment. It doesn't actually affect me.

Where is the hole?
- In the earth.
- No, in the air, because...
- No, in the earth, because the earth is so strange. The earth is round; I think there is a crust connected to the ozone. I don't know whether it continues.
- Perhaps it has to do with electronics.
- It's horrible, there are terrible things like war...
- Where the earth ends, there's a shield. But now, there's a hole in it. A little one, because of the missiles.

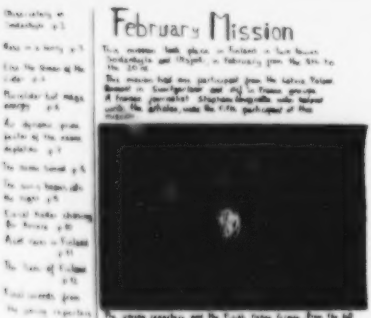
(Kantonschüle Reussbühel, Lucerne, Switzerland)

Projet ozone actualités newspaper

The european journal

Projet Actualités ozone

of young reporters about Earth environment



February Mission

The young reporters and the Finn Norse Group from the left. The 6 members of the Finn Norse group: Audrey Hardy, Eleanor Hurdal, Tatiana Hasselberg, Marion Bindel and Knut Sabon.

Edited and layout by Audrey Hardy

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Special issue March 1992

JANUARY MISSION

This issue is about the second young reporters mission in Kiruna, Sweden 18-28 January.

Nathalie Kremer, France, Peter Hilty, Switzerland, Kirsi Pallilo, Finland, Renee A Reis, Norway and Agnes Baumgartner participated on the mission.

The european journal

Projet Actualités ozone

of young reporters about Earth environment

KIRUNA

The european journal

Projet Actualités ozone

of young reporters about Earth environment

Editorial

Sommaire

Rédigé à partir d'octobre 1991 trente classes de lycée de l'ensemble des pays européens à une campagne de recherche sur l'ozone, par l'intermédiaire d'une quarantaine de leurs envoyés spéciaux sur les sites scientifiques polaires : échanger les travaux en direct durant toute l'année scolaire grâce à un réseau sophistiqué de communications par ordinateurs et à un journal mensuel spécialement édité, puis faire la rencontre les trente classes participantes durant une semaine en juin 1992.

C'est la mise en place de ce réseau européen d'enquêtes sur les grands équilibres écologiques, à partir du problème particulier de la couche d'ozone qui rassemble depuis novembre 1990 cinq équipes pilotes, d'élèves, et d'enseignants de lycées situés en Allemagne, au Danemark, en France, en Suède et en Suisse.

Les travaux du premier comité d'organisation du projet, qui a rassemblé à Gif-sur-Yvette (Essonne, France), les 2-3-4 mars 1991, les représentants des équipes pilotes, ont posé les premières pierres de ce chantier de pratiques novatrices en matière d'éducation à l'environnement.

"Projet ozone actualités", dans l'esprit du projet pilote, se veut l'expérimentation de l'organe interne de communication des participants. Un journal à jusqu'à septembre 1991 pour évoluer et trouver la bonne formule de choix linguistiques, de sélection des articles, de maquette d'équipe rédactionnelle et de périodicité.

Projet ozone actualités - numéro 1 - Vendredi 15 mars 1991

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The european journal

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Final words from the young reporters p. 16

December Mission

Edition and layout by Anders Poulsen

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The european journal

Projet Actualités ozone —

of young reporters about Earth environment

Welcome to the new teams !

Introduction

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The whole purpose of the investigation work lies in the use that is made of it: what is the point of writing something if no-one reads it? This was the primary reason for setting up a computer server that would be accessible to each group and would provide the groups with the means of exchanging information quickly as the project progressed, at a minimum of cost and across national borders. The electronic data transmission system is described below.

The advantages of this system can be summed up as follows:

- Any message dispatched takes only a few seconds to reach its addressee; one can thus receive an answer the same day.
- All of the messages are stored on the same site. This means anyone can retrieve any previous message at any time, from any computer, by means of a wide variety of criteria: number, date, author, subject matter, etc.
- The messages can be distributed automatically to all of the members; the author can even ascertain which members have actually read it.
- The messages can be directly used in word processing or desktop publishing applications, etc. (without retyping, and without any problems as regards compatibility), from any computer on the network. This makes it easier to publish a newspaper using articles submitted by numerous groups, or for each group to use the messages for its own publications, display them, or distribute them within its own particular circle.
- All of the groups can log in at the same time; this makes

it possible to hold full-scale meetings or multilateral "teleconferences".

The main drawbacks are as follows:

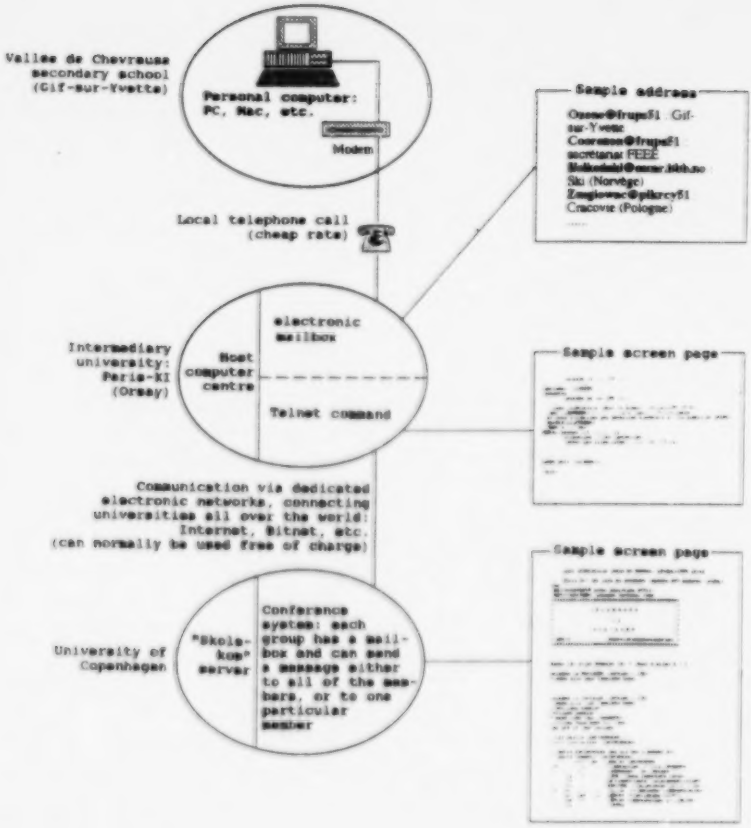
- Once the system is set up and running, anyone can use it; getting it started within each school, however, can be tricky and requires certain technical facilities, such as a telephone line, a computer, a modem, the creation of a mailbox, the use of Telnet, etc. Each new case throws up new problems: in Finland, for example, only the name of the computer (and not its number) could be used for the Telnet hook-up; in Sweden, the name used for the mailbox contained a Swedish letter that was not familiar to the rest of Europe; in Poland, the Telnet command was not available, etc.
- Universities are not obliged to provide access to their computer centres; while the majority are more than willing to do so, some may refuse or demand a subscription fee.
- It is very difficult to relay images.
- Ensuring that pupils can make free use of the computer can be difficult, depending on the facilities available and the established practices of the schools concerned.

The system was mainly used, in fact, during the assignments: as a fast, reliable and daily means of communication, it enabled the groups to receive fresh reports each day, and to relay their questions. The dispatches received from the Far North provided a major stimulus for the pupils who had remained behind, and gave them ideas for their own research.

Outside these "peak" periods, the frequency of the transmissions varied greatly, particularly as several groups only became connected quite late on, and tended to use the system fairly erratically. The groups that made most use

of the service were those where there was a computer buff among the pupils or staff.

There is no doubt that a communication facility of this sort can be a tremendous asset, in that it brings together members of a network that spans the entire continent of Europe (see on this subject the article entitled "Inquiry as a means of understanding, communication and, ultimately, self-discovery", page 42).


Vallée de Chevreuse secondary school (Gif-sur-Yvette)
Personal computer: PC, Mac, etc.
Modem
Local telephone call (cheap rate)
Sample address
Intermediary university: Paris-XI (Orsay)
Host computer centre
electronic mailbox
Telnet command
Sample screen page
Communication via dedicated electronic networks, connecting universities all over the world: Internet, Bitnet, etc. (can normally be used free of charge)
University of Copenhagen
"Skole-kom" server
Conference system: each group has a mail-box and can send a message either to all of the members, or to one particular member
Sample screen page

Standard layout of the computer network

The group at the vallée de Chevreuse secondary school uses an ordinary computer connected to the telephone via a modem. It can thus hook up to the nearby Université d'Orsay, which allows it to use the dedicated lines, and to access the central server in Denmark instantly, just as one would by telephoning direct.

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The computer network is the brainchild of a Danish mathematics teacher, Mr Erik Dam. Below, he describes the various stages in getting this exciting new facility set up and running (translation from French text).

"Right from the outset, the project organisers wanted to use electronic data transmission. At first, I thought of a Minitel system, which would, among other things, have made it possible to send images. The cost of such a system, however, quickly put me off – as it would have been based in Denmark, each group would have had to make an international call to Denmark in order to hook up.

In the end, I opted for the electronic networks that link up most of the universities world-wide (Earn or Bitnet for example). Designed for research purposes, they make it possible to swap information instantly and free of charge by E-mail, that is electronic mail. We could have made do with this, but our objective was rather more ambitious.

For this experimental project, I managed to obtain free access to a sophisticated system run by the Danish Ministry of Education, which provided a conference system (Skole-kom). Each group can gain access to it from a mailbox provided by the nearest university, thanks to the Telnet command, which lets you hook up to a remote computer exactly as you would by telephone – but from one country's electronic network to another's, so that you only pay for the local telephone call. The diagram above outlines the structure."

Erik Dam, mathematics teacher in Copenhagen (København Dag-og Aftenseminarium)

A key event: the assignments

What exactly do all those researchers do in the depths of the Arctic winter, exiled in the Far North of Scandinavia,

among the reindeer and the aurora borealis, in a mysterious space centre equipped with all mod cons?

Therein lays the main task of the young reporters: to find out what these scientists were researching by observing them in action, and then to enable their correspondents back home to examine the scientific issues involved in the research on the basis of their reports, with the aid of their teachers, who would provide clarification where necessary.

The young reporters' working methods

The written work is the core component of the assignments, inasmuch as it provides the link with the readers and justifies the activities. In order to turn it into a functional tool, the young reporters observe certain elementary journalistic rules, under the supervision of a student from the Centre de formation de journalistes in Paris. Each morning, the latter holds an editorial meeting, in order to prepare the daily message, select an experiment for in-depth examination, or a particular event that ought to be covered, etc.

A computer enables the young journalists to write up their report at any time in their office in Esrange or at Kiruna secondary school. In the evening, the texts are checked over before being relayed to the computer server in Copenhagen, where the groups' reactions are likewise recorded. This interactive process was essential, if the assignments were to be much more than just a carrot at the end of a stick, in other words, genuine educational tools. Their actual use depended on the teachers, but at least the opportunity was there, each group having received very clear instructions about how to guide their special envoys' investigations and steer them towards the subjects of their choice. Although in practice this objective often proved overly ambitious, certain exchanges, never-

theless, indicated its aptness, such as here, at the time of the first assignment:

"Thank you for your exciting reports. Here is what we propose:

- The data obtained by aircraft and balloons are – of necessity – limited in terms of time and space. Are they sufficient to estimate ozone depletion at the North Pole? Or do they serve as a complement to the satellite data?
- What is the effect of PSCs on the ozone layer?"

VI Liceum, Cracow, Poland, 20 December 1991

Young reporter's reply:

"With regard to your second point, I think I have an answer: it seems that PSCs freeze certain molecules that normally affect the chorine atoms, preventing them from destroying the ozone molecules. Since these molecules are frozen, the chorine is freer to act. We will send further details in a forthcoming article on PSCs."

Anders Poulsen, reporter for the Danish group

Other types of friendly, informal exchanges played an equally essential role in helping the young reporters feel they had an attentive audience, in what was, after all, a highly unconventional exercise, however exotic and fascinating it may have been:

"Personally, I would very much like to find out more about this aurora borealis. I photocopied a few pages from an encyclopedia that I displayed on the information board as a bonus. Was it green, red or purple? Did it do the twist, the tango, the rumba or just the waltz? P.S. Poo, we've translated and summarised the text on aeroplane lasers for polar clouds. Excellent. *Pax vobiscum.*"

Eddie, Collège Sismondi, Geneva, Switzerland, 16 December 1991

Tackling science by highlighting its most appealing aspects

This whole discipline sprang from the educational basis of the ozone project. The idea was to tackle science by highlighting its most appealing aspects – the slow accrual of experience, the setbacks, the pressure due to meteorological, technological and cultural difficulties, such as they were experienced by the young reporters. These aspects normally remain hidden owing to the refusal by many researchers to disclose anything other than complete, corroborated results, mainly for fear of alarming public opinion with incomplete, misinterpreted information.

Witnessing this process of human endeavour, thanks to prolonged periods of direct contact with researchers, makes it easier to tackle the sort of complex knowledge on which scientific work relies.

The assignments produced three types of reports documenting the visits. A few extracts are given below:

a. daily dispatches that relate events as they happen, without analysis or explanation. These texts announce forthcoming articles and relate them to everyday life. See "Dispatch of 25 January 1992";

b. articles describing a particular scientific experiment, chosen for its appeal and its potential contribution to scientific understanding. See "Seventeen hours of pressure and doubt" and "Polar stratospheric clouds";

c. so-called "breathers": profiles of researchers, cultural events, anecdotes, etc.

Dispatch of 25 January 1992

• Wednesday: breakfast at 4.30 a.m., followed by an interview at 6 a.m. with the campaign co-ordinator, John

Pyle, just before the balloon launch. Kirsi talked to a Russian researcher in order to find out about the Pinatubo volcano.

* Thursday: two bad accidents on the road to Esrange (Agnès was taking photographs and driving at the same time). We met Jean-Pierre Pommereau, a French scientist in charge of ground-based measurements.

* Friday: we went to Kiruna airport at 10 a.m. On the way, we admired a magnificent sunrise, which lit up the vast Swedish forest. At the airport we saw the ARAT (atmospheric research plane). There was a talk on it given by a French engineer, Christian Allet. I took a particular shine to him because, like me, he had difficulties with his English!

Seventeen hours of pressure and doubt

During the night of 16 and 17 December, four research teams took part in the release of a 420 kilogram basket. It needed a large balloon, with a cubic capacity of 100 000 cubic metres, plus good climatic conditions. A tricky experiment, which requires calm weather.[...]

The balloon is made of very special material, a type of plastic that is highly resistant to cold. It weighs 300 kilograms, measures 88,5 metres in length, and has a maximum volume of 100 000 cubic metres; filled with hydrogen, it can carry a load of 450 kilograms at altitudes of around 30 kilometres. Two 540-cubic-metre auxiliary balloons, filled with helium, help to get the load off the ground at the point of release.

During the ascent, the atmospheric pressure drops, the volume of the balloon increases and, through the effect of this expansion, the temperature of the hydrogen inside the balloon falls. This temperature is then lower than the atmospheric temperature, which is already very low; the wall of the balloon cools until it reaches a potentially criti-

cal threshold. The plastic material becomes brittle and is liable to tear, causing the balloon to explode. In order to avoid this, one regulates the drop in temperature of the gas, by controlling its release: a remote-controlled valve enables the French engineers from the Centre national d'études spatiales to release gas whenever the temperature and pressure so require.

A wind is getting up

10.30 p.m.: the Japanese researchers, who are having a few technical hitches, try to finish preparing their instruments. On the launching pad, the two auxiliary balloons have already been filled with helium.

11.30 p.m.: the basket finally arrives at the launching pad hangar. There is a strange atmosphere. The researchers are a little annoyed with the Japanese team, who offer no explanations of their earlier difficulties. No doubt they are thinking about their own hard work, and now the Japanese might be going to ruin everything. The countdown stops.

0.40 a.m.: at last everything appears to be ready. After the final checks, the basket is taken outside and the engineers begin to unfold the main balloon on the launching pad. The countdown resumes. Happy at last, the German scientists crack open a bottle of wine.

1.00 a.m.: a wind is getting up. An attempt is made to launch the balloon, but something goes wrong and there is talk of a disaster. From where we are positioned, it is very hard to grasp what is happening, when suddenly one of the engineers is carried towards the hangar. He has a large gash on his head and blood is spurting out: it's awful! He collided with the basket at the moment of take-off. The others make him comfortable in the hangar and bandage him up.

From that point on, everything happens very quickly. The balloon is released and we can see it rapidly disappearing into the darkness. It only took a few seconds, and yet we had been waiting for seventeen hours.

Poo Lendorff (Geneva, Switzerland), Annsofie Ruuth (Kiruna, Sweden), Anders Poulsen (Ballerup, Denmark).

Polar stratospheric clouds

How and why do polar stratospheric clouds influence the ozone layer? This question lies at the centre of most of the research being conducted as part of the EASOE campaign.

Returning to the subject of PSCs. These clouds form when moist air masses reach very low temperatures, less than –85°C, during the long polar night for example. This is directly related to the creation of a vortex in the polar stratosphere. The vortex is an atmospheric whirlwind caused by the thermal contrast between temperate regions and polar regions, which are very cold owing to the lack of solar rays. The prevailing whirlwinds isolate the polar air masses from the rest of the atmosphere.

The vortex phenomenon is much more pronounced in the Antarctic, where the presence of a vast isolated continent in the middle of the ocean accentuates the drop in temperatures. This is one of the main reasons why the "hole" has appeared over the South Pole. At the North Pole, the vortex is less pronounced owing to its meteorological instability, which is due to the presence of the continents that surround the Arctic Ocean.

At these temperatures, the nitrogenous constituents of the atmosphere (including our $ClONO_2$ "reservoir") react with several other molecules (mainly H_20 and HCl) to form trihydrous nitric acid crystals (HNO_3), which make up the PSCs. The formation of these clouds thus inhibits any effect that the nitrogenous compounds might have in their gaseous state.

Thus, instead of remaining stable, our "reservoirs" interact through the effect of cold to produce HNO_3 and Cl_2.

$HCl + ClONO_2 \rightarrow HNO_3 + Cl_2$

Cl_2, which is released by HNO_3 crystallisation, is once again photodissociated to give two chlorine atoms, which begin their catalytic cycle of ozone destruction, because they can no longer be captured by the nitrogen oxides, which have been inhibited by the PSCs.

It appears, therefore, that PSCs are responsible for two major factors in the destruction of the ozone layer: denitrification and the presence of exceptionally high concentrations of chlorine. Scientists are particularly keen to verify this through experiments to measure nitrogen oxide and chlorine levels in the presence of PSCs, by passing stratospheric balloons through the latter.

Anders Poulsen, Ballerup, Denmark

What do the young reporters provide that professional journalists do not?

Scientific popularisation in the form of documents intended for a large, external readership (by means of the press) was not the primary objective of the ozone project: even with the best professional environment, secondary school pupils could obviously not hope to match the standards of those who specialise in this line of work.

The idea of getting secondary school pupils to produce these articles was inspired by quite different objectives: to enrich the school curriculum, to foster an understanding of serious environmental problems, to broaden national horizons, and to motivate pupils to learn writing and communication techniques.

The best articles – which were primarily the result of the pupils' own disciplined approach to writing – could in future provide material for full-scale popular works, pro-

duced by professionals, which would be highly original in terms of the way they addressed the problems examined, given the setting and the vivid accounts of scientific research.

The way in which the young reporters perceive things contributes something very rare, and salutary, to the portrayal of science – its human aspects. The scientific content, which is the reason for their presence justifies a human approach to the researchers, who are themselves highly receptive to this, and who come across as reassuringly normal – cheerful, irritated, sensitive and contradictory. No longer is science an alien world of technical complexities, raw knowledge and impenetrable mathematics: our own people have gone there, experienced it for themselves and assure us that scientists are flesh and blood after all.

How did the scientists react to the project?

The attitude of the scientific community towards the ozone project would seem to indicate that it is highly receptive to this type of initiative. The welcome that we received in Esrange bears witness to this: the Swedish officers in charge provided us with an excellent working environment – our own office, telephone, computer, printer, fax machine and even someone to contact in case of practical problems. The Swedish centre also provided all of the meals taken on site, free of charge.

The majority of the researchers, even at their busiest times, did not mind the young reporters being there; some – including the overall co-ordinator of the campaign, Dr John Pyle – were always ready to provide running commentaries of the various operations. The considerable efforts devoted to making the young reporters feel welcome reinforced their sense of the importance of their assignment and heightened their determination.

Karin Petzoldt, a meteorologist at Berlin University, neatly sums up the attitude of many researchers: "These young reporters are a millstone round our neck, our work is hard enough as it is. But it is so rare to come across such excited youngsters that we genuinely want to help them". Close ties were forged, deeper than normal working relationships with professional journalists. Estrange is a remote, futuristic, confined, male, adult environment; the research teams spend long months there, working in the Arctic darkness: the unexpected arrival of young secondary school pupils had an enlivening effect, and it was this more than anything that enabled them to infiltrate the world of science.

What made these impressions fully meaningful was the fact that they permeated the articles, so that the pupils back home could truly share the experience. The discussions held during the end-of-project assessment helped us to appreciate this: "Our main discovery has been the realisation that the researchers are much more open-minded individuals than we originally thought". All of the members of the groups claimed they had gained a new, much more realistic and, in some cases, tempting vision of science. For some, a scientific career had become a much more tangible objective, inspired by a conscious and genuine interest in what science is all about.

The quality of this co-operation is undoubtedly due to the moral commitment on the part of most researchers to communicating their work to the public at large, but above all to their own involvement in preparing for the visits. In order to define the ground rules for the young reporters and the dates of the visits, the FEEE held numerous preliminary discussions and meetings with the relevant scientific authorities at every level: with its local correspondents at the CNRS (French national scientific research centre), with the group organising the campaign (Europe), and with the campaign reception centres (Sweden and Finland).

A sound financial framework for heightened educational impact

In order that the project should be truly educational, and not just a passive exercise, it was organised in the context of a lightweight set-up run by its active members. This in turn gave rise to a number of basic principles:

a. Participation is free of charge. The newspaper was distributed, access to the computer network was provided and regular communiqués were received automatically, as soon as messages and articles began to be dispatched on a regular basis.

b. Everyone had a hand in co-ordinating and organising the network through organising committees, which also served as milestones, and a valuable means of learning about different cultures.

c. The preliminary inquiries, evaluation committees, assignments and other meetings entailed expensive travel arrangements. Fundraising was supposed to be part of the educational activity, in that it would enable pupils to learn at first hand how the organisations contacted operated. The central budget provided the necessary impetus, in that some of the expenses incurred were refunded.

Impact in terms of awareness-raising

The participants, irrespective of their age, thus had sole responsibility for their own activities. This ensured, in particular, that the initiatives received widespread coverage. In order to find sponsors, the groups had to publicise themselves; quite unprompted, they got in touch with their respective local and national media, which featured their initiatives and the results of their work. Thirty or so full-scale articles appeared in the local or national press, in all of the countries involved.

The impact of the project can thus be summed up as follows: in order to participate, the groups inform the

network of how their region is involved in the subject concerned, in terms of research, politics, etc. In the process of explaining this to outsiders, they themselves gain a better understanding of it. Thus, even as they are disseminating this information abroad, they are at the same time helping to raise awareness in their own countries: through lectures, exhibitions, and the media coverage that they themselves organise.

How can relevant education, respect for the environment and the perception of Europe be mutually complementary?

Introduction

The Foundation for Environmental Education in Europe (FEEE) conducted this programme by way of an experiment, because of the novel and wide-ranging nature of its approach. Having looked at the more concrete aspects, we will turn our attention now to its intellectual foundations and the conclusions to be drawn when they were put into practice. This could be described as our research report.

The issues raised by European co-operation in the sphere of education are very complex and do not admit of any general solution. Also, the approach adopted in the ozone project is not readily exportable: it derives from highly specialised, daily endeavours, developed over a number of years; so we cannot propose any methodology for reproducing it.

By describing its underlying principles, however, we can perhaps demonstrate, for anyone not familiar with it, how the European dimension contributes to education, the scale of the problems raised and a possible means of tackling them.

We have therefore chosen to present:

a. The problems on which we based our research:

- at secondary school level the acquisition of knowledge is more often perceived as a necessity than as an interesting activity in its own right;
- the study of a broad-based theme that is closely related to pupils' own concerns can stimulate their desire to study;

- there is an increasingly keen desire among pupils and teachers alike to study Europe and to play a part in its construction.

b. The means that we have developed for this purpose, in particular:

- creating a need for close communication through the exchange of information derived from a specific, gradual process, namely the inquiries undertaken;
- weaving a coherent body of information around a major theme, in order to encompass the widest possible range of knowledge and resources;
- observing science at the sharp end, in connection with serious issues;
- regarding changes in attitudes as the product of an education that recognises the importance of responsibility.

c. Our position regarding certain major corollaries of any European co-operative project: the problems associated with language barriers, travel and exchanges, and organisational responsibilities.

Relating school education to contemporary problems, while capitalising on a lively curiosity about Europe

A touch of naivety in the search for a genuinely relevant approach

The refusal to submit to one's environment, and the quest to understand it in order to influence it are what distinguish the human race from other species of animals; human evolution, too, is a long, hard struggle to exert an increasing influence; this means understanding more. The desire for knowledge, curiosity and wonder in the face of discovery are fundamental to every human being. The energy expended by young children in trying to make

sense of the universe around them, in learning to walk, to use their bodies and eventually speak is all the more fascinating because it is naturally associated with play, joy and pleasure.

Oddly, later on in childhood, the appetite for knowledge gradually gives way to resignation: one learns less and less for pleasure, and more and more from a sense of duty. With the result that by the time they get to secondary school, amid the traumas of adolescence, generations of future adults have already lost the desire to influence events around them and settle back into a relatively fatalistic conception of their social mission.[1]

By the time they leave school, the majority will have correctly assimilated the knowledge imparted to them, without ever questioning or influencing the existing structures, which they then merely set about reproducing; a minority will have fled a world that had written them off as academic failures. Those precious few who emerge fulfilled, erudite and liberated doubtless owe the fact less to the quantity of knowledge acquired than to a healthy sense of perspective, gained through encounters with other frames of reference.

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1. There are of course significant differences depending on the educational systems concerned and, in particular, the socio-cultural environment. We ourselves witnessed an extreme case, which illustrates this all too well. As part of the selection procedure for the young reporters, each group had to nominate one candidate: this gave rise to some heated arguments among pupils lured by the exciting prospect of a trip to northern Scandinavia. Curiously, in two groups the choice proved difficult for the very opposite reason: none of the pupils wanted to go. Only one of these two groups put forward a candidate, whose parents repeatedly threatened to cancel the trip "lest it should interfere with her studies". On making inquiries among the teachers, I realised that the lack of candidates was not, in most cases, directly due to the parents' refusal, but rather to the pupils' own fear of failing their exams as a result of ten days' absence from school. It is unlikely that these two cases are merely a coincidence: the two groups came from the same school, consisted of pupils of different ages and streams, and were supervised by two separate teams of teachers. The establishment in question is situated in a fairly affluent, middle-class suburb in the south-west of Paris, which, ironically, boasts the highest concentration of scientific establishments in France.

Wherein lies the crisis among secondary school pupils and teachers? Quite apart from the political and practical difficulties, it perhaps lies partly in this loss of meaning, this monumental gap between knowledge that is essentially desirable, and knowledge that ends up being perceived by its recipients merely as a necessary evil, and whose fundamental importance for their future adult relationship with society (in terms of analysis and responsibility) is obscured by some rather off-putting declared objectives: for example, study hard so as to get a "good" job.[1] The prospect of docilely taking up one's place in society without first subjecting it to a thorough examination is not always an enticing one for adolescents who are just beginning to see the world through their own eyes, with its wars, famines, crimes, torture and inequalities.

The teaching of science is particularly symptomatic of this gap between the fascination often aroused by its central mission, namely to understand the universe and its origins, scientists' passionate commitment to their job, and the way in which science is very often perceived by schoolchildren. Science can seem like a series of dry, uninspiring facts, with no apparent connection to each other and, at any rate, no practical relevance. The realisation of its infi-

1 It strikes me that the numerous pressures (mainly family pressures, but very often brought to bear with the acquiescence or even encouragement of the school) suffered by pupils in their choice of subjects and, ultimately, career are not dissimilar to those brought to bear on young people right up until the twentieth century with regard to marriage. Fathers who forced their daughters to take a husband never thought to cause them harm: logically speaking, their offspring could only benefit from a good, solid marriage. Dictating which subjects one's children should study stems from much the same noble intentions: is it not only logical to steer them towards an interesting, well-paid job? European culture, however, has long ceased to presume that logic should prevail in matters of the heart, so why should it be any different where work is concerned? And besides, should not the job shortage incline us if anything to seek a better match between type of employment and people's natural inclinations, which are by far the best indicator of aptitude?

nite complexity can often put children off, rather than lead to an enlightened and enchanting vision of the universe.

Scientific specialisations, furthermore, have come to occupy a growing place among the most prized academic qualifications; as a result, the rift between science and the arts within secondary schools has widened in numerous education systems (particularly in western Europe), to the point where it has become a dividing line not just between pupils' inclinations for one or other field, but between standards of academic performance in general. In the most seriously affected systems, the majority of pupils opt for science, with arts students merely being seen as science "rejects".

The pattern is most evident in schools where pupils study both science and the arts, and where, statistically speaking, science students achieve the best grades even in arts subjects. By not allowing pupils' natural inclinations to dictate their choice of subjects, we merely accentuate their lack of motivation; some force themselves to study science because they think they ought to, while others turn to the arts through resignation.

The lure of the unknown

So what is the answer? Fortunately, the human capacity for wonder is pretty much unquenchable, and may even be all the stronger for having been starved. Rooted deep within each individual, it merely needs some prompting to reveal a genuine desire to study, which imbues the knowledge conveyed with an aura of discovery (the pleasure of understanding something that is problematic) as opposed to simple ingestion (the resignation in assimilating something that is felt to be alien, because one feels one ought to).

Admittedly, many teachers make a point of exploiting this capacity in their lessons, but more often from their own personal instinct for teaching than on the basis of any

vocational training, ministerial directives, school curricula or even the social environment of the school concerned. Our experience has enabled us to verify, on a different scale, the immense power of attraction of two areas, which are normally overlooked by schools and yet can be extremely enriching:

a. Indignation triggers the need to understand: wars are analysed, waste and pollution are explained, and the desire to understand in turn engenders the desire to learn what are often very complicated things, particularly knowledge traditionally taught at school. To take the example of science again, whole sections of the syllabus assumed a very specific meaning when we studied the ozone layer: chemistry of the atmosphere, movement of air masses, wavelengths of solar radiation, effects on matter, etc.

Although it cannot replace subject teaching, which is essential, a complementary, thematic, across-the-board approach can help to endow the latter with a much more inspiring justification than "just learn it, you will understand why later"; it can also serve the end purpose of such teaching, since learning becomes more in the nature of a voluntary process.

Such an approach to knowledge, based on a broad theme offering sufficient scope for inquiry, gives full meaning to the concept of interdisciplinarity. It is introduced as a means (because the nature of the problem studied necessitates a comprehensive approach) rather than an end (through the desire to follow a fashionable trend in teaching).[1]

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1. Some education systems, moreover, have been advocating this method for years. We were able to get some idea of its effect when teams of teachers responsible for advising the pupils were formed for each group. Collaboration between teachers of different subjects developed automatically in some groups (particularly in the Scandinavian countries, which have a long tradition of such practices) yet met with resistance in other institutional frameworks, where it challenged the established *modi operandi*. All of this suggests that those involved in different systems would do very well to communicate.

b. Europe and its history, its cultures and its diversity is a source of fascination for children from all European nations. There is an enormous demand on their part for interchange and discovery, and an edifying realisation when this interchange occurs – in other countries, other people live, think and reason according to different frames of reference from our own. Aiming for this type of interchange and managing to legitimise it, to have it recognised and accepted by society via the framework of school education, can ennoble the mission of schools while at the same time providing a keener sense of perspective.

It is the combination of these two forces, normally neglected by schools, that explains the intense motivation on the part of the pupils and teachers who participated in the ozone project. It was conceived as an opportunity to address traditional school subjects via an exciting contemporary theme and as part of a European co-operation project.

We were particularly gratified to observe just how far the European dimension, whose educational potential was fully exploited thanks to an inspiring thematic medium, helped foster not just a closer acquaintance with Europe and its various cultures (and hence a heightened sense of perspective), and greater awareness of a major environmental problem, but also, more fundamentally, a much more genuine perception of the value of knowledge.

Inquiry as a means of understanding, communication and, ultimately, self-discovery

Feeling part of Europe

The European dimension was coupled with a thematic medium designed to provide an outlet for its potential. It was through the experience of working together that pupils from the various countries acquired a true appreciation of the diversity of the European dimension and

came to incorporate it in their everyday frames of reference. Studying and working together on the same problems gave the interchange its full intensity.

This brings us to two situations that are potentially counterproductive from an educational point of view:

- working in isolation on a particular theme, with a view to comparing results in a spirit of competition (the reports themselves may be excellent, yet the co-operation minimal, and hence the degree of interchange very limited);[1]
- introducing the European dimension through the topic of Europe alone. It is of course enough simply to reflect on Europe in order to work at a European level, but that does not necessarily imply an appreciation of the underlying processes: the cross-fertilisation of cultures and ideas. It is essential to provide the latter situation with an area of common ground, by studying a specific, transnational problem for example. By addressing the problem together, and comparing respective approaches, it is possible to penetrate the European dimension via an active process that reveals its essence.

How, apart from choosing a common theme, can one best ensure that the latter situation serves to kindle a sense of belonging to Europe? Working together across great distances requires communication. The large amount of information exchanged prior to any meeting whets the appetite and generates anticipation; the pupils' determination to live up to the other party's expectations when they

1. It is important to guard against this risk because it springs from an implicit attitude, which is still very widespread, if not predominant. I remember very clearly a welcoming speech given by the headmaster of the secondary school that was hosting one of the first international meetings of the project in France: "I am led to believe that there will be a competition at the end, so I will conclude as follows: may the best team win, and may they, with any luck, be French."

finally meet is rendered all the stronger. Also, it is not a bad idea to allow future adults to make use of one of the most fundamental components of our society – the media and their techniques – and one that can be dangerous if it is perceived as alien.

Fostering communication through inquiry

Conducting inquiries proved to be a key factor in creating a European dimension. Inquiry is a way of getting to grips with a particular theme; it provides an excuse for regular communication since there is always something new that needs to be said. It places pupils in a situation where they are encouraged to stretch themselves, confronts them with the real world and involves them in a difficult and highly educational exercise as far as taking initiatives and human relations are concerned.

What exactly do we mean by the process of inquiry? First and foremost, it is a discipline that involves producing instructive information based on specific events. It reaches out beyond the classroom walls to track down any information on the topic concerned, as part of an active approach that is not confined to documentary research or teachers' explanations. And then formatting this information with a view to communicating it, at the very least, by compiling an article in such a way that it is both comprehensible and interesting to the reader, and via any other medium that pupils may wish to employ: slide show, drawings, video, sound track, etc.

In practice, this discipline encourages pupils to act on several fronts, by:

- devising an inquiry project based on those aspects of the topic that interest them most;
- doing the groundwork: in the case of an interview, for example, this might mean drawing up a list of questions

(based on a basic study of the problem) or arranging a meeting (and hence presenting the project);

- meeting experts: namely researchers, industrialists and politicians in the case of the ozone project;
- coming face to face with others: for example, a class of young children or passers-by in the street;
- collating the information obtained and compiling a document that combines this information with an account of how the inquiry was conducted;
- distributing this document and answering any questions.

Educating pupils in project management

The role of teachers is of course fundamental here. It is also a tricky one because, if left entirely to their own devices, the pupils will not get anything out of the exercise, which is, as a rule, unlike anything they have done before, and yet, we believe, depends for its success largely on their ability to see it through on their own, from start to finish. The role of teachers is thus to act as facilitators, encouraging the transfer of skills as far as possible in order to ensure that all runs smoothly, while at the same time refraining from acting in the pupils' place.

There is, in fact, an unfortunate tendency, when organising the inquiries, to underestimate what pupils are capable of. Many teachers automatically assume that it is their job to arrange the meetings and trips, etc., leaving it to the pupils to operate closer to home. We believe, on the contrary, that the educational aspect of the inquiry is greatly enhanced when it is organised by the pupils (even young ones), with the essential back-up of their teachers as regards preparing for meetings, timetabling and ensuring that the group meets its commitments. As an activity in its own right, the inquiry can become the pupils' own personal project and teach them how to manage initia-

tives: drawing up a programme, making mistakes, amending the programme and meeting targets.

It is a difficult yet rewarding exercise; the pupils were more surprised than anyone to find themselves treated as responsible partners. They were able to observe the tangible results of their work, thanks to their published articles, exhibitions and the interest shown by the local press.

The exercise is enhanced and facilitated by interaction with other groups conducting inquiries elsewhere, as is the habit of communicating – not just about the results obtained, but about the process of inquiry itself. In other words, sending all of the other groups a short bulletin on each new event that occurs, however insignificant; presenting the group's plans, describing their reception at a particular meeting, their failures, etc. That means recounting how the information is produced, as opposed to simply detailing its content.

This continuous exchange of information, which serves to convey a European dimension, mitigates the difficulties involved in the inquiries by forcing pupils to describe how they evolve, and by providing inspiration in the form of messages received from other groups. The more groups there are, the greater the effect. As the number increases, however, another problem emerges: dispatching messages in thirty separate envelopes – or even faxing them for that matter – to thirty other groups on the network can be an exhausting business.

Using computers to communicate

It is here that electronic data transmission can really make a difference (see description on page 20). There is nothing to stop schools using university networks in connection with fairly small-scale projects, as we did; do not hesitate to ask. On a larger scale, the use of European networks dedicated to secondary education will be necessary. Some

countries are already putting considerable efforts into these; the potential benefits have been amply demonstrated by numerous existing applications, particularly in America.

Finally, the process of inquiry introduces pupils to journalistic techniques, which allow them to perceive the written word in a very different light from that shed by traditional school practices. In compiling an article one finds that there is no one "correct" method of writing – as many schools would have us believe – but rather numerous techniques, which correspond to various usages, and whose importance in modern-day society makes it only right that we should acknowledge them. Moreover, these techniques can also enhance pupils' command of language and their ability to express ideas.

Trying one's hand at journalistic writing can provide an opportunity to examine the media and information in general. There is an enormous need to produce individuals capable of adopting a critical stance towards the media, rather than just consuming whatever is served up. Understanding how news is written can help pupils to decipher the way editors prioritise news, and to form their own opinions on the basis of open-ended, carefully thought-out beliefs, as opposed to any prevailing arguments that the media might use to woo – or at any rate avoid antagonising – audiences on whom they rely for their funding.

Learning to form one's own opinion

Bringing together groups whose paths seldom cross

Our strategy was to weave together, around a combination of the two driving forces mentioned above (major study topic / European co-operative framework), a collection of the most diverse elements, in order to encompass the widest possible range of knowledge and resources.

Originally, we saw this diversity as a way of optimising the potential of the thematic approach, which is all the more effective because it covers a large number of fields.

As we began to implement it, we became aware of the opportunities for discovery that it affords, and which are essential in order to whet the appetite for learning. Each field has its own public, and in a great many fields they seldom have the opportunity to mix. Bringing together fields in which such encounters are unusual means bringing together sections of the community that were hitherto unacquainted with or unaware of each other's existence.

The motives of the various participants in the ozone project, pupils and teachers alike, were thus very diverse, depending on their particular area of interest: scientific research, ecology, writing and journalism, computers, European culture, languages, educational research, etc.

A wonderful melting pot

Europe is an endless source of diversity: each new region brings its own vision. In the case of education systems alone, there is a quite remarkable contrast between the infinite diversity of these systems across Europe and most teachers' ignorance of what underlies this diversity. Everyone knows that things are different elsewhere, yet few can say in what respect. Asking everyone to describe in detail how education works can be enormously helpful; this was borne out by the half-impassioned, half-incredulous reactions to the reports that we asked the host teams to present, on the occasion of each meeting.

The present human components of the European continent – borders, cultures, national structures, languages, religions, etc. – constitute the best possible history book; one merely has to consider them to get closer to one's roots. The dramatic changes in eastern Europe are a marvellous event not only for the nations concerned, but also for any teachers of history and geography who can turn

them to good account. There is an immense mutual curiosity and, in our view, co-operation between young people from western Europe, and central and eastern Europe offers a wealth of opportunities for both sides. It heightens their perception of European history and their awareness of Europe, through a mirror effect by:[1]

- Observing the result of totalitarian regimes through the post-communist legacy greatly sharpens one's perception of the concepts of democracy and human rights (combating extremist views), and provides a valuable lesson in some of the minor troubles afflicting western societies.

- Realising that there is nothing magical about the west and that development is not something which is presented on a plate by new governments, but that it is the product of civic endeavour (civic education).

Changes in attitude: should they be imposed or induced?

In our view it is essential to ensure this diversity of backgrounds, while refraining from laying down the law about which topics should be studied if one wishes to raise awareness of these topics, as in our case with regard to the European dimension and the complexity of natural balances.

1. Secondary schools in member countries of the EU run a certain risk when it comes to selecting regions with which they wish to work: if it is their intention to focus on the European Union, they may be tempted to confine themselves to member states. In my opinion, however, comparing differences is the best way of grasping specific features, especially when they are of an abstract nature. If a particular topic is centred around the EU, the involvement of non-member countries will greatly facilitate pupils' understanding of what the EU is all about. The opposite idea (namely, that in order to cultivate EU awareness, one should only work with member countries) is very widespread, particularly among certain Commission officials. Except in the case of programmes that are explicitly dedicated to co-operation with non-EU countries, these officials take a fairly jaundiced view of such initiatives (or at any rate, apply a quota) when it comes to funding, even if the funds go only to participants from member countries.

Many opinion trends operate through an excellent form of internal militancy, which increasingly justifies the stance taken by their members. The support thus procured is matched by the virulence of expression, which tends to repel anyone who is not instantly seduced, and thus deprives them of certain arguments – not all of them necessarily irrelevant – that might have influenced them. The upshot of this process is a lack of credibility in the eyes of those very sections of the community whom it was important to convince. The green movement and more recently, the trends in favour of or against European integration (the links between the two are quite notable) rely heavily on this form of recruitment, based on group psyc*.ology and the influence of fashionable thought.

That is why we consider it imperative, from an educational point of view, to adopt a strict line of conduct: raise a particular issue, explain it, provide as many arguments from both sides as possible but, above all, allow each individual to form his or her own opinion, whether it be with regard to respect for the environment or the relative nature of national cultures. Respect for others' opinions on the part of the organisers is essential for successful interchange between groups from very different backgrounds. Broadly speaking, treating everyone – and in particular secondary school pupils – as individuals who are capable of drawing their own conclusions from what they know, one can slowly teach them to distinguish between judgements that are the product of their socio-cultural environment (prejudice: that which is judged in advance, by others and imposed by one's environment, era, education, etc.), and those that stem from conscious reflection.

Some people, mainly involved in the ecology sphere, were thus prompted to object to our project on two grounds:

- Why study the ozone layer given that it is such a controversial subject within the scientific community itself? Is there not a danger of contributing to a deliberate

scheme to focus on non-existent problems, in order to divert attention from more fundamental issues?

- What is the point of having such complicated apparatus simply in order to study a particular problem? It will not stop the ozone layer from disappearing.

These objections highlight the special nature of our approach:

- it is much more absorbing to observe scientists when they are developing the foundations of knowledge in connection with some serious issue than when they are simply verifying some minor theory whose foundations are already clear. In particular, it makes it easier to understand their approach, which is not based on immutable laws but rather on doubt, hesitation and changing situations.

The image of a science constructed from eternal truths merely contributes to the obfuscation of non-scientists. The scientific community badly needs to acquire a more human face, to get closer to the people who finance it and to rid itself of esotericism, which endows it with a dubious omnipotence.

At school level, this can influence the perception that pupils have of science, as a rather dry and joyless instrument of selection (the best pupils study science), in contrast to the passionate excitement often evinced by scientists themselves.

By presenting itself in a way that is neither unduly modest nor arrogant, scientific research can help science education to resolve the deep-rooted problems mentioned above; indeed, it is in its own interest to do so, if it is to avoid missing out on potential recruits owing to an inability to adapt to the constraints of school education.

- Clearly, understanding a problem does not mean resolving it. One can make do with dictating "green atti-

tudes", which the most fervent believers in the overriding importance of economic profitability will be loath to adopt simply in order to be in tune with the times.

As we see it, a more sound approach is to proceed from the idea that two noble objectives can be mutually complementary: education and respect for nature. If we accept that the standard of education in any given society determines the degree of civic-mindedness of its members and its capacity for progress, then it makes eminent sense to study an environmental problem whose power of interrogation and interdisciplinary nature can serve the general quality of education. And while it is true that humanity must stop endangering the earth's ecosystems, it is equally true that educating oneself by examining major environmental issues is bound, in the end, to induce a sophisticated perception of the complexity of ecosystems, and hence a sense of moral obligation towards them, coupled with a realisation that the earth is a finite and fragile resource.

The idea then, is simultaneously to provide pupils with a civic education, educate them in environmental matters and broaden their minds, by exploiting a fundamental curiosity about Europe – all the more keen for having been untapped – on the part of today's young Europeans. Europe, it seems, signifies something profound, but the question is what?

Choice of language

With regard to oral communication

Our original aim was to ensure that the pilot teams took complete charge of the project, in order that they might play a genuinely constructive role. When called upon to choose the working languages themselves, the teachers immediately opted for English only. Clearly, the insistence that they use English in public would be highly beneficial to the pupils, while at the same time simplifying commu-

nication between the participants in the project. Everyone – including the teachers – made enormous progress in English. Even pupils who at first could only mumble a few words gained confidence by forcing themselves to speak, even if it meant making mistakes.

In the course of the meetings and assignments, however, it become apparent from the cumulative misunderstandings that communication was impossible, given the very poor English. The group effect, when one endeavours to hold a meeting in an unfamiliar language, is particularly disastrous: not only did people misunderstand things, but they were convinced they had understood perfectly well.

The potential pitfalls of an international programme

It is important to beware of the pedantry that is readily suggested by the sense of taking part in an "international programme", whose inherent prestige can so easily create barriers between individuals, which are further obscured by the use of schoolboy English: an excellent recipe for confusion, since one rapidly assumes that the other person, who understands just as little as you, will fail to comprehend that you did not in fact grasp what was said. Not to mention the divisions that the use of another language create between those who are proficient in it and those who are not. All of which can be very inhibiting. Unless it is handled with care, shock treatment (for example, working at an international level), instead of shaking people up, can send them scurrying into their shells.

How can this best be dealt with? At the very least, since language is a tool, by matching the tools used as closely as possible to the objectives of the communication process.

Is the objective to improve language skills? If so, there are no drawbacks, theoretically speaking, to using English, providing one also uses all the other languages that the

participants may have in common: German, Italian, Russian in some cases and very often French.

In practice, however, there are two objections to this goal:

- improving language skills is a process in itself, which is fully effective when everything is exclusively geared to it;
- it does not leave much room for that which language is supposed to facilitate: communication. Either the discussion is unrestrained, no-one checks for correct understanding, and errors obscure whatever is being communicated; or the discussion is supervised and the ratio of quantity of information exchanged to concentration required is very low: one cannot strive for very long for perfect mutual comprehension in a language one has only learnt at school, without risking mental exhaustion and a sense of the pointlessness of the information communicated.

Improved language skills or communication: an inescapable choice

This objective, therefore, can hardly be said to serve the needs of a theme-based project, whose capacity to promote a sense of improved collective understanding of the topic concerned depends precisely on the abundance and accuracy of the information exchanged.

There is nothing magical about the solution: one must communicate in one's mother tongue, or in a language in which one is totally proficient. As we see it, interpreting facilities must be provided as a matter of course, whenever the aim of the discussions is not to use language as a tool for its own sake, but rather as a means of conveying information.

Simultaneous interpreting is seldom practicable – each new oral translation slows down the discussion considerably. Realistically, therefore, one cannot translate into

more than one or two languages at once; it is thus important to take account of the language situation when organising discussions: either by dividing the latter into thematic and linguistic workshops, or by restricting the project in advance to a set number of working languages.

With regard to written communication

The problem here is very similar, insofar as the idea is to communicate information regularly with a view to making collective headway in the study of a particular topic: the ability to understand is paramount, which again implies the need for translation.

It is only with the utmost difficulty that oral exchanges can be made to combine a thematic objective with a linguistic one; written communication, on the other hand, which is not necessarily affected by the time factor and group psychology, can do this quite easily. It is in fact the simplest way of incorporating the European dimension in ordinary teaching practice: no syllabus or methodological changes are necessary in order to work within a language class, on a literary text or indeed on an article intended for the other groups in a network.

This could even be designated as a specialist task for certain groups, or certain pupils. We are thus planning in the near future to try the following system:

- with regard to the computer network:

a. Each message is relayed in two complete versions: in the author's mother tongue, and in the international language of their choice (normally English).

b. Each message received is circulated within the group in three complete versions: the two received (international language and original version), plus a translation into the group's language based on one of the two versions received.

– with regard to the newspaper:

a. An international edition contains the articles received, in two versions: international language and original version. This not only helps to convey information, but also serves to demonstrate the diversity of European languages.

b. Summaries of the main articles, or even full translations, are published in the mother tongues, in each linguistic area, by a specialist team.

Travel in order to work, but not vice versa!

The high point of the learning process comes when pupils and scientists meet face to face, during the trips abroad. It is through the experience of travel that we become most keenly aware of the relative nature of our judgements. The power of travel to broaden the mind is quite startling and the idea of travel has a potent, universal appeal.

There is a major pitfall lying in wait for anyone responsible for organising exchanges; whether or not they can avoid it will depend on whether the exchanges are conceived as a simple cultural trip, an opportunity to sample the local cuisine and folklore, or whether they are study trips in the true sense of the term, offering a wealth of new discoveries and challenges. No amount of care taken over the organisational side of things can replace the real aspirations of the participants themselves, which will determine whether or not they derive full benefit from the opportunities afforded.

If we are to avoid the pitfall in question, we must generate just the right amount of excitement about the idea of the trip, without allowing the latter to become an end in itself. If this is to be done, considerable thought must be given to the best way of motivating teachers and pupils alike.

Quite simply, travel is exciting and expensive. Dazzled by its prospect, some groups who participated in the ozone project treated the inquiries merely as a preliminary to the trips abroad, that is to say, without any attempt to connect the two, without initiative and hence without producing anything of interest to other people. The same groups, on the other hand, put a huge amount of effort into fund-raising. And very successfully too, by misleading many organisations who, bombarded with requests, allowed themselves to be swayed more by the groups' sheer persistence than by the actual substance of their projects; all of which suggests that, in this particular instance at least, money is no measure of genuine worth.

Since then, we have adopted a much stricter line: travel must never be cited as a reason for taking part, and as long as the serious investigative work is not finished, the attitude must be: "It will probably be necessary to meet up, and we will try to do so. For the time being though, the important thing is to complete our inquiries."

That said, we would certainly recommend an initial trip to anyone starting up a project, as the best way of embarking upon any form of co-operation with a foreign partner.

a. Draw up a clear, readable document, outlining the topic and approach and how these fit in with the school curriculum.

b. Create a large number of communication channels, based on the desired number of partners: personal contacts, specialist press, networks of associations (education movements, etc.) and institutions (interministerial partners), diplomatic networks (embassies' cultural, linguistic and educational sections), etc.

c. Identify your partners by exchanging letters and making phone calls, make sure that they understand your proposals correctly, and ask them to organise as soon as

possible one or two launch days for the project within their respective establishments, to coincide with your visit.

d. Your visit will then be an excellent opportunity to foster dynamic local interchange between teachers and pupils. It will enable them to put a face to the project organiser, and to hear about the procedure directly from you, while at the same time bringing you face to face with the practical realities of European co-operation.

A delicate framework that fosters responsibility

Conducting an educational project at a European level is a fairly intrepid undertaking. No one, at this point in time, is capable of handling every aspect of an activity that brings together institutional frameworks, cultures and very diverse perceptions, at a highly unusual level.

While project organisers at the sharp end of the process quickly realise this, the same cannot always be said for the partners involved – pupils, parents of pupils and teachers. Inevitably, the notion of European co-operation often tends to generate confidence in a prestigious and hence solid framework, rather than a clear perception of the many intangibles involved. It is the duty of the organisers to alert others not just to the uncertainties of which they are aware (in particular, funding), but to the generally uncertain nature of the project as a whole.

This inherent quality of the European dimension once again provides an opportunity to teach children about responsibility, by involving pupils in a project where everything is not cut and dried, and which has to be constructed. Not only do their efforts constitute the very lifeblood of the project (with each individual being able to feel the impact of his or her own effectiveness or ineffectiveness), but they can genuinely see that each step, each success is their own work, and learn by analysing the causes of any failures.

Moulding something with one's own hands, and actually being able to gauge the result are among the most profound effects, in terms of self-confidence and motivation, highlighted by the final assessments conducted among the participants in the ozone project. Some have learnt from the experience that it is more rewarding to try and realise an idea in which they believe – at the risk of failing – than to dismiss it out of hand as a nonstarter.

A Danish participant in the project, aged nineteen, wanted to give a written account of his own dawning sense of responsibility, which we have seen fit to include here.

A pupil's reflections on his involvement in the project

Getting started

The start-up phase is very important: you need to grasp the idea of the project, its objective, and how it will end. "Our" project was a pilot project, and most of these questions remained unanswered during the time that our group was involved.

Your own project

It was up to the participants in the pilot project to decide what to do and how to organise their project. This was very difficult at first, inasmuch as there were no concrete plans or set tasks, of the sort normally found in school. Ultimately, however, this approach is more useful: this time you have the chance to do things in whichever way you yourself choose. If you are energetic and motivated, you can conduct the project as you wish. There is a real sense of involvement: if you do not do anything, nothing gets done.

The work

If you have plenty of energy, it is then that the fun can really begin: you do all the enjoyable things that it would be "natural" to do at school – learning how to interview, to investigate and raise money, and you use school subjects in a new way. You take part in meetings, which improves your English far more effectively than ordinary lessons.

Conclusions

Even the final outcome of the project was modified by the participants: having expended so much energy, none of us wanted things to end in 1992. The topic may change, whether by choice or necessity, but the important thing is that new generations of pupils from all over Europe should have the opportunity to experience a period in their school education that is both different and stimulating. It is the participants who make the project work, so you will have plenty to do. Be where the action is and make the action happen.

Anders Poulsen, a pupil from the Ballerup group (Denmark)

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Appendix I: "Jeunes reporters pour l'environnement", a permanent educational network

The encouraging results of the ozone project have prompted the FEEE to extend the idea, within a permanent network christened "Jeunes reporters pour l'environnement". This network encompasses secondary schools from all over Europe, which join the FEEE by signing a charter defining their basic activities: conducting field surveys on any subjects connected with the environment, writing articles, communicating and debating among themselves.

At regular intervals, the FEEE organises assignments as a special opportunity to highlight the scientific aspect of environmental problems, and to draw public attention to the network's activities: each assignment, which is educational as well as intensely exciting, is accompanied by public relations initiatives at both local level (people in and around the schools taking part in a particular assignment) and national level (televised broadcasts, specialist press).[1]

The network is open to any type of secondary school, with no restrictions in terms of numbers or nationality. In some countries, national organisations acting as professional operators provide important services to groups in their country: technical, pedagogical, scientific and finan-

1. We believe that when a very specific group – namely secondary schools, which produce the information and are at the heart of the activity – are brought together with a much wider audience, in its role as keen spectator, the effect on both groups is much stronger than if we were to develop separate programmes for each. On the one hand, we have young people getting actively involved in the media, where normally the only role permitted to them is that of passive consumer. And on the other, we have an audience accustomed to highly standardised "journalese" being addressed from a totally new angle. School education (with all its attendant toil) and the business of heightening public awareness (with all its attendant superficiality) can do each other a tremendous service, through a rare – and hence very bold – process of cross-fertilisation.

cial assistance. A number of such operators are due to set up in the course of 1994, in the following countries: Denmark, France, Germany, Greece, Ireland, Italy, Portugal, Romania, Spain, Switzerland, Turkey and the United Kingdom. In all the other European countries, we are looking for organisations (governmental or other) interested in the programme and willing to join with a view to adapting and developing it in their own country.

We are also very keen to find teachers willing to introduce groups of pupils to the network, irrespective of whether they live in one of the countries mentioned above. For details, please contact the author of this report at the secretariat of "Jeunes reporters pour l'environnement" (address given on page 10).

Below is a copy of the charter of "Jeunes reporters pour l'environnement":

Charter governing participation in the "Jeunes reporters pour l'environnement" network

To participate in a European network of young reporters specialising in scientific and environmental matters, by conducting field surveys, writing journalistic articles and disseminating these articles; To appoint a main reporter who will participate in an assignment in a scientific centre, and to report on major environmental research campaigns.

Summary and objectives

"Jeunes reporters pour l'environnement" is a network of secondary schools scattered across the entire continent of Europe. The active members of the network are groups of pupils aged between 14 and 20, from one or more classes within the same school, and led by a teacher-cum-co-ordinator. Their activities are for an unspecified period, and may begin at any time; they may therefore be spread

over several academic years. The activities consist of two separate yet complementary phases:

- in much the same way as a specialist press agency, conducting field surveys at local level on topics concerning both scientific research and the environment, with a view to writing journalistic articles, then exchanging these articles and discussing them with the other young reporters in the network, before disseminating them to a local, national and international readership;

- appointing a main reporter from amongst the group members, in other words, a special envoy to represent the group on a assignment organised by the FEEE for the purpose of analysing and reporting on a scientific event related to the environment, through direct contact between the young people and the researchers.

In organising such a project, the FEEE hopes:

- to improve pupils' knowledge of major environmental issues and foster the changes in attitude that they necessitate;

- to help pupils feel more closely involved in the educational process:

  - by tackling traditional learning via issues that are of very real importance to society;

  - by encouraging pupils to meet the people directly involved in these issues, in the field;

  - by communicating with other young people, across national borders.

- to address the general public from a new perspective, by exploiting young people's ability to perceive and portray a science, which is forever evolving, in connection with vitally important environmental issues.

To this end, the FEEE:

- concentrates on direct contacts with each group, by endeavouring to visit secondary schools, and bring together their representatives at a European level;
- is developing two powerful, innovative, Europe-wide media: a central videotext server and a European newspaper distributed to pupils in all of the groups;
- in connection with the field assignments, compiles documents designed to raise public awareness in conjunction with the relevant media, particularly radio and television.

A core activity: inquiry

Joining the network

At any time of the year, groups wishing to join are asked to send the FEEE two copies of this present charter, jointly signed by the headteacher and the co-ordinating teacher, and accompanied by written presentations supplied in two complete versions (mother tongue and English):

- a presentation by each teacher involved, concerning the way in which he or she personally intends to conduct the project;
- a presentation by the pupils, concerning their operational framework (group, school, region, etc.), the subject(s) of their inquiries, and their specific plans as regards investigations.

Ideally, each group should be led by a team of teachers covering three key areas: analysis (science, geography, economics), inquiries and writing (literary subjects), culture and communication (languages). It is strongly recommended that this charter be duplicated, then read and commented on by all of the pupils in the group.

Following any additional correspondence needed, the FEEE will register the groups that have supplied these documents, and will return a signed copy of the charter to

them. At that point, the FEEE will offer to arrange for one of its representatives to visit the groups concerned, in order to explain more about the project and explore the possibilities as regards setting up communication facilities (use of the videotext server).

Inquiries

The whole identity of the "Jeunes reporters" network is founded on the perception of real life, scientific research into environmental issues, with the emphasis on "environment" and "science". Within this conceptual framework, the groups are completely free to choose their topic(s) and method(s) of inquiry. Any teams intending to apply for one or more assignments (see "Assignments") would be well advised, however, to choose a topic that ties in with the latter.

The aim of the inquiries is to seek information beyond the confines of the classroom and books, by meeting the people involved in the topic concerned. The inquiries may thus comprise the following stages:

- reading documents, lessons prepared by the teachers, classroom presentations: with a view to acquiring a basic knowledge of the chosen subject, in order to determine which matters ought to be explored in the field;
- surveys in the street, interviews with friends and acquaintances, etc., in order to assess the expectations/queries of people in the local area, and their degree of awareness of the chosen topic;
- interviews, examination of the work done by researchers, industrialists, politicians, journalists, etc., in order to investigate the topic itself.

The young reporters communicate closely with the rest of the network, by sending short, frequent reports on how their inquiries are progressing. Relayed to each group via the computer network, these messages act as a vital spur:

each new development in the life of the group, however seemingly insignificant, is reported on the network.

Upon completing an inquiry, the young reporters write up their article(s) with a journalistic aim in mind: any reader who is unfamiliar with the project and totally ignorant about the subject matter must be able to feel that it is of relevance to him or her, and derive information concerning both the subject and the way in which the young reporters investigated it. The young reporters relay their article(s) straight away on the videotext network. Whenever it sees fit, the FEEE compiles an issue of the network newspaper, containing a selection of these articles, reproduced in part, in full or in the form of brief summaries.

Each message or article received from another group is examined by the whole group, and as often as possible elicits questions or reactions, which are then fed back to the original group. The teachers are also encouraged to send messages and comments to the videotext server, in two complete versions (mother tongue and English).

Lastly, these inquiries provide an opportunity for ongoing interchange with the local community, in the form of exhibitions, lectures, debates, etc.

A further opportunity: the assignments

From time to time, the FEEE organises assignments. Involving one to three weeks' intensive fieldwork, they enable teams of three to five main reporters to conduct an in-depth analysis of some scientific event, while keeping in touch with their respective schools by means of electronic data transmission.

These assignments should be seen not as exotic rewards confined to a privileged few, but as educational tools, whose effectiveness depends entirely on the teachers' efforts to:

- present them as an opportunity for direct interaction with the event in question;
- stimulate this interaction by getting the pupils back home into the habit of questioning the main reporters;
- capitalising on the interest aroused, which is not enough in itself, by relating their lessons to the articles received (extending knowledge to an examination of its implications for society).

For each assignment, the FEEE publishes at least two months in advance, a description of the topic and a closing date for applications. The latter are examined at a European level, according to the criteria set forth below. Each group selected appoints one main reporter to take part in the relevant assignment. Unless otherwise stipulated, the same group can apply for more than one assignment.

Participation in the assignments is optional; a group can be a fully-fledged member of the network without ever applying to take part in an assignment.

Conditions governing participation in the assignments:

Applicants must:

- be registered members of the network (signed charter);
- have access to the videotext server (mailbox set up and running);
- have submitted to the FEEE, by the closing date for the chosen assignment, an application in two complete versions (mother tongue and English), composed of articles based on inquiries, and additional written appendices. Only texts that have already been disseminated on the videotext server by the date on which the application is received by the FEEE will be taken into account.

Assessment criteria:

1. The articles must combine two key elements:

- information on the subject examined;
- an outline of the steps taken by the pupils in order to obtain this information.

The assessment will focus primarily on the link between these two key elements; their individual merits will be accorded much less importance. Applications will be systematically rejected if they cover only one of the two aspects, however well: for example, by only presenting rehashed information derived from documentary sources, or by describing a particular inquiry without providing any genuine information.

2. There should be some connection between the subject of the assignment and that of the articles submitted.

3. Additional criteria (assessment of the appendices):

The inquiries are the core of the educational approach. The appendices will explain how the articles were actually used, by including for example:

- precise details, supplied by the teachers, of how the project ties in with the lessons;
- the questions addressed to the authors of a particular article on the videotext server;
- questions received (enclose the replies given).

The groups are not the intended targets of the awareness-raising exercise, but rather a vehicle for the latter. The appendices will therefore describe the efforts made in the past, and those planned for the future, to raise awareness in the local community. Participation in an assignment is an excellent opportunity to attract the attention of the general public and the media, and it is important that each group make the most of it.

Appendix II: Addresses of establishments that took part in the project and names of the co-ordinating teachers

Denmark (two groups):
Kobenhavn Dag-og Aftenseminarium, Ejbyvej 25-43, 2740 Skolvunde.
Mr Kjeld Hansen (pilot group and new group).

Finland (one group):
Utsjoen otsonikerho, Saamelaislukio, 99980 Utsjoki.
Mr Juhani Harjunharja.

France (five groups):
Lycée de la vallée de Chevreuse, 8, rue de Madrid, 91190 Gif-sur-Yvette.
Ms Marie-Laure Calza (pilot group).
Ms Marie-Odile Augé and Ms Marlyse Kuchly (new group).

Lycée Jean-Monnet, place de l'Europe, 78940 La-Queue-lèz-Yvelines.
Mr Marc Puissegur.

Lycée technique Raspail, 233, boulevard Raspail, 75014 Paris.
Mr Guillaume Etougué.

Lycée Marquette, place Foch, 54700 Pont-à-Mousson.
Ms Viviane Wozny.

Germany (one group):
Altes Gymnasium Oldenburg, Theaterwall 11, 2900 Oldenburg.
Mr Rolf Schudnagis (pilot group).

Latvia (one group):
Lycée français de Riga, Meness 8, 226013 Riga.
Ms Anda Minulova.

Norway (two groups):
Skedsmo Videregaendeskole, P.B. 351, 2001 Lillestrom.
Ms Tove Kielland.

Kontra Videregaendeskole, P.B. 354, 1401 Ski.
Ms Idun Frank Folkedahl.

Poland (one group):
VI Liceum im. A. Mickiewicza, Waska 7, 31-057 Cracow.
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Postscript

How can the programme be extended to a wider audience?

The ozone project was a research programme conducted by an independent body, the Foundation for Environmental Education in Europe (FEEE), with no instructions from any institution dealing with the various fields addressed; the project was deliberately confined to a fairly small audience.

We now have the means to extend it, within the "Jeunes reporters pour l'environnement" programme. Eventually, the network is expected to encompass a few hundred secondary schools right across Europe. It will have specific objectives, in particular, to use the material produced by the networked groups as a means of raising public awareness, via the press and the local influence of each group.

In terms of helping to give school curricula a more decisively European slant, this figure is still insignificant compared to the tens of thousands of secondary schools that exist throughout Europe. The introduction of regular exchanges and voluntary co-operation with education authorities would enable us to pursue a more far-reaching objective: namely, to ensure that a much larger number of pupils and teachers benefit from the results of such research.

In our opinion, the institutional use of external research, far from jeopardising the quality of programmes implemented by governmental bodies, actually complements the latter, inasmuch as the ability of systems to handle their problems is closely related to their ability to stay in touch with what is happening on the ground. The publication of this monograph by the Council of Europe, recognised in the field of education leads us to hope for an

examination of our work by the competent authorities of its member states. The FEEE wishes to make it known that it is very keen to form closer structural links with any institutional managers who so wish.

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From 1990 to 1992, secondary school pupils from nine European countries joined forces to conduct field investigations, and communicate among themselves on the subject of a major environmental issue: the ozone layer, which shields the earth from dangerous solar rays. The high point of the project was an opportunity to witness in action the scientists who monitor the atmosphere from their polar laboratories. The ozone project – as it was christened – was conducted on an experimental basis by the Foundation for Environmental Education in Europe (FEEE), as part of an exciting new effort to develop theme-based projects within a European co-operative framework, using schools to provide a fresh perspective on the environment and communication.

This monograph, published as part of the project entitled "A secondary education for Europe", recounts the experiences of these young "reporters" – local inquiries, Arctic assignments and assessment. The second part analyses the educational merits of the project, in the hope of providing useful clues and inspiration for any teachers who find themselves confronted with the increasingly urgent question of how to introduce schools to the European dimension.

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